

No.	Document	Relevant passages/Abstract
1	GB 795 601	Abstract of <b>GB795601</b> 795,601. Grinding. HOFMANN, E. F. Oct. 2, 1956 [June 15, 1956], No. 29995/56. Class 60. A surface grinding machine has a spindle carrier guided for vertical adjustment in a machine frame 1 by V-section prismatic gib 9, 10, 11, 12 situated in pairs on two opposite sides of the machine frame and engaging V- section slots in the spindle carrier. The gib 9, 10 are bolted to a front face of the machine frame, and the gib 11, 12 are attached by studs 15 to blocks 16 fitted into apertures 17 in a rear casing or shield 2 which is secured to the frame 1 by screws 3. The blocks 16 are adjustably positioned by set screws 19 screw-threaded in lugs 21 on covers 22 which are attached to the casing 2 by screws 23. A second similar set of gib 9, 10, 11, 12.
2	US 5,273,367	Abstract of <b>US5273367</b> A linear motion rolling guide unit and a damper apparatus used in this unit are described. Vibrations in both the direction of movement of the slider and vibrations in planes perpendicular to this direction of movement are effectively suppressed, and moreover, damping characteristics can be set as desired. This linear motion rolling guide unit includes a damping device with a plurality of damping apparatuses provided on a slider so as to be juxtaposed around a track rail, where the damping apparatuses include a liquid which is allowed to flow between sealed chambers to provide a damping effect.
3	EP 0 528 541	Abstract of <b>EP0528541</b> A machine is disclosed having novel air bearings for supporting one machine part for translational movement on another part in a first direction X. Each bearing takes the form of a track (5A, 14, 16) on one of the parts providing concave part-cylindrical bearing surfaces (5A, 14A, 16A) and pads 25 on the other part providing confronting convex part-cylindrical bearing surfaces 25A. The arc lengths of the part-cylindrical bearing surfaces are such as to provide restraint against relative movements between the machine parts in at least one sense of both of the two directions (Y, Z) orthogonal to the direction (X) of the translational movement. The advantages are relative cheapness of manufacture compared to vee-bearings and a capability of the bearings to self-align under load.
4	US 6,036,366	Abstract of <b>US6036366</b> PCT No. PCT/SE97/00113 Sec. 371 Date Sep. 21, 1998 Sec. 102(e) Date Sep. 21, 1998 PCT Filed Jan. 24, 1997 PCT Pub. No. WO97/27129 PCT Pub. Date Jul. 31, 1997 A bearing device in such linear actuators which comprises an elongated hollow profile rail, in which a slide member can be moved backwards and forwards along flat guiding surfaces in the hollow profile rail. In pairs, the guiding surfaces form an angle with one another. Between the hollow profile rail and the slide member are slide bushings arranged in pairs. The slide bushings each include a flat face that abuts against the guiding surfaces of the hollow profile rail, and a curved face that abuts against a correspondingly configured seat in the slide member.
5	US 5,143,454	Abstract of <b>US5143454</b> A sliding contact type linear motion guide unit having at least one of desired anti-vibration and braking functions is provided. The unit includes a rail extending over a desired length, a slider movably mounted on the rail and a sliding member interposed between the rail and the slider. The sliding member includes an elastic solid member fixedly attached to the slider and a contact member fixedly attached to the elastic solid member and having a contact surface in sliding contact with the rail. In the preferred embodiment, the elastic solid member is constructed by a corrugated spring, rubber, a synthetic resin or the like so that the contact pressure between the contact member and the rail can be maintained substantially unchanged and uniformly.

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A linear guide assembly which includes a slide body that is moveably supported on a guide rail by a non-rolling bearing insert. A channel extends longitudinally through the body and the guide rail is received in the channel. The bearing insert facilitates longitudinal movement of the body along the rail. The nature of the mounting of the bearing insert to the body in the channel is such that the bearing insert can be readily removed from the body when excessively worn and replaced without also requiring replacement of the body.

## Abstract of EP0682188

The guides has a rail (1) with at least three guide surfaces (3a-3d) and a runner (2) with a slide strip (7a-7d) arranged between them. The flat surfaces of the slide strip are placed on the matching flat support surfaces of the inside of the runner which has at least one groove (9a,b) running between two slide strips (7a, c; 7b, d) and parallel to the slide strips. The groove's width can be adjusted by screws. The flat surfaces of the slide strips rest on flat guide surfaces (3a-e), and have part-cylindrical surfaces resting on corresponding part-cylindrical grooves (8a-d) on the inside of the runner. The runner has at least one groove (9a,b) running between and parallel to the two slide strips.

Summary:

The present invention has the task to easily, quickly and efficiently reduce the wear of moving parts as well as guide rails on or in which moving elements are provided. The invention consequently provides for a continuous and progressive elimination of a disadvantageous clearance necessary for proper functioning of machines as well as negative effects on the characteristics and the efficiency of the devices.

In addition the invention has the object to simplify the use of guide rails, to provide easy changes as well as providing easy handling. It serves to perfection of V-rails whose sides are separated and which belong to different elements which can move relative to one another. The guide rail element onto which the highest forces are applied and which is therefore subject to the greatest wear is provided on the frame or on a movable part connected therewith and can be moved.

In order to achieve the desired centring this element is moved in the desired direction and therefore acts upon the axial position of the slider. After obtaining the desired centring the first element is fixed in its locking position while the second element is brought into contact with the slider and also fixed after displacement.

## Translation of column 2, ll. 3 - 20

Fig. 1 shows the design of a classic V-rail. Due to the uneven wear of the sliding surfaces it is obvious that a movement in the direction  $\rightarrow f$  can only change the clearance between the rail and the sliding guide, while the axis 00' of this element is no longer situated in the initial position. A second movement of the rail in vertical direction is therefore necessary in order to bring it back into the initial position. There is no device making a vertical movement possible.

In order to achieve this the guide rail has to be fined down or a slope has to be provided by providing cotters between the rail and the carrying element. Of course, this can only be done discontinuous and in larger time intervals, while the work conditions during this time are poor because the centring cannot be save guarded. In addition, it is tedious, unprecise and difficult.

## FR 1 261 540

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# PATENT SPECIFICATION

(1)  
795,601



Date of Application and filing Complete Specification: Oct. 2, 1956.

No. 29995/56.

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Complete Specification Published: May 28, 1958.

Index at Acceptance:—Class 60, D2F8.

International Classification:—B24b.

## COMPLETE SPECIFICATION

### Guiding Means for the Grinding Spindle Carriers of Surface Grinding Machines.

I, ERNST FRIEDRICH HOFMANN, a German citizen, of Gustav, Adolfstrasse 14, Göppingen, Württemberg, Germany, do hereby declare the invention, for which I pray that a 5 patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to surface grinding 10 machines having spindle carriers guided for vertical adjustment in the machine frame.

In accordance with this invention, the spindle carrier is so guided by V-section, prismatic gibs situated in pairs on two opposite sides of the machine frame and engaging 15 V-slots in the spindle carrier.

With this arrangement, a substantially vibrationless guiding of the spindle carrier is obtained, since the grinding means prevents 20 movements of deflection, thus ensuring good quality of surface-finish grinding with the machine.

The accompanying drawings represents a 25 exemplary embodiment of the invention.

Fig. 1 represents a horizontal section through the machine bedplate and the grinding spindle carrier.

Fig. 2 shows these parts on a reduced scale in partially sectional elevation.

In this embodiment the machine frame is 30 designated by 1. A rear casing or shield 2 is removably attached to the machine frame 1 by screws 3. The grinding spindle carrier 4 is of rectangular cross-section and has adjacent to its outer longitudinal edges and 35 parallel thereto, vee slots 5, 6, 7, 8, which are accurately ground to size. These slots are engaged by similarly accurately ground prismatic gibs 9, 10 fixed on the front face, and

adjustable prismatic gibs 11, 12 on the rear 40 face of the machine frame. Below this arrangement of gibs is a second, identical system of gibs only one 13 of which is shown (Fig. 2).

The prismatic guide gibs 9 and 10 are 45 attached to the machine frame 1 by bolts 14. The prismatic gibs 11, 12 and the corresponding lower gibs 13 on the rear face of the machine are on the contrary attached by studs 15 to blocks 16 fitted in apertures 17 50 in the rear shield 2. These blocks 16 are held in place by set screws 18, 19, having a screw thread 20 over part of their length by which they screw into lugs 21 in the covers 22, attached to the rear shield 2 by screws 23, 55 25. The prismatic gib 11 is adjusted in place by the set screws 18, 19, and held therein by locknuts 24 on the screwed parts 20 of the set screws bearing on the lugs 21. The other prismatic gibs 12, 13 are adjusted and held 60 in an identical manner.

What I claim is:—

1. A surface grinding machine, having a 65 spindle carrier guided for vertical adjustment in the machine frame by V-section, prismatic gibs situated in pairs on two opposite sides of the machine frame and engaging V-slots in the spindle carrier.

2. A surface grinding machine according to 70 Claim 1, in which the prismatic gibs on at least one side of the machine frame are made adjustable as by set screws.

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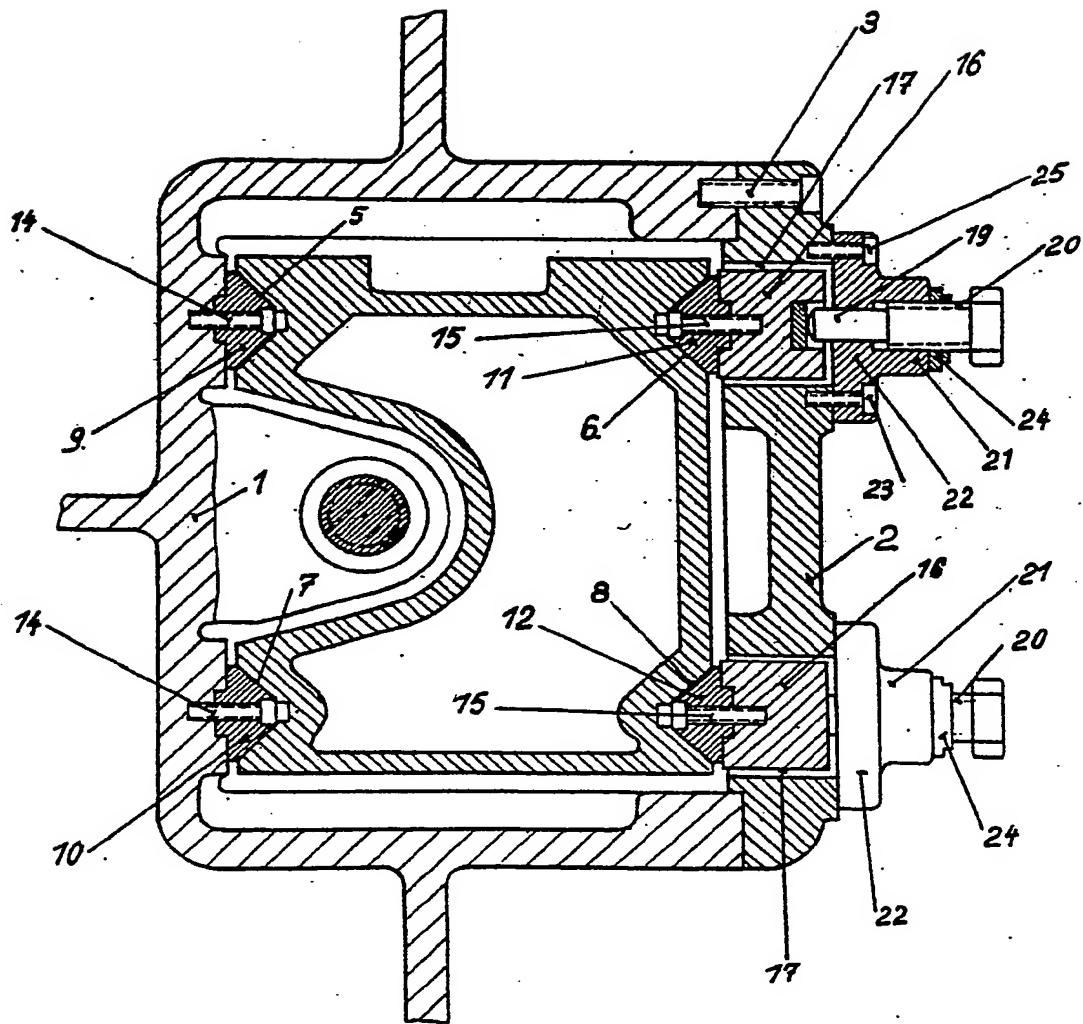
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Fig. 1



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2 SHEETS

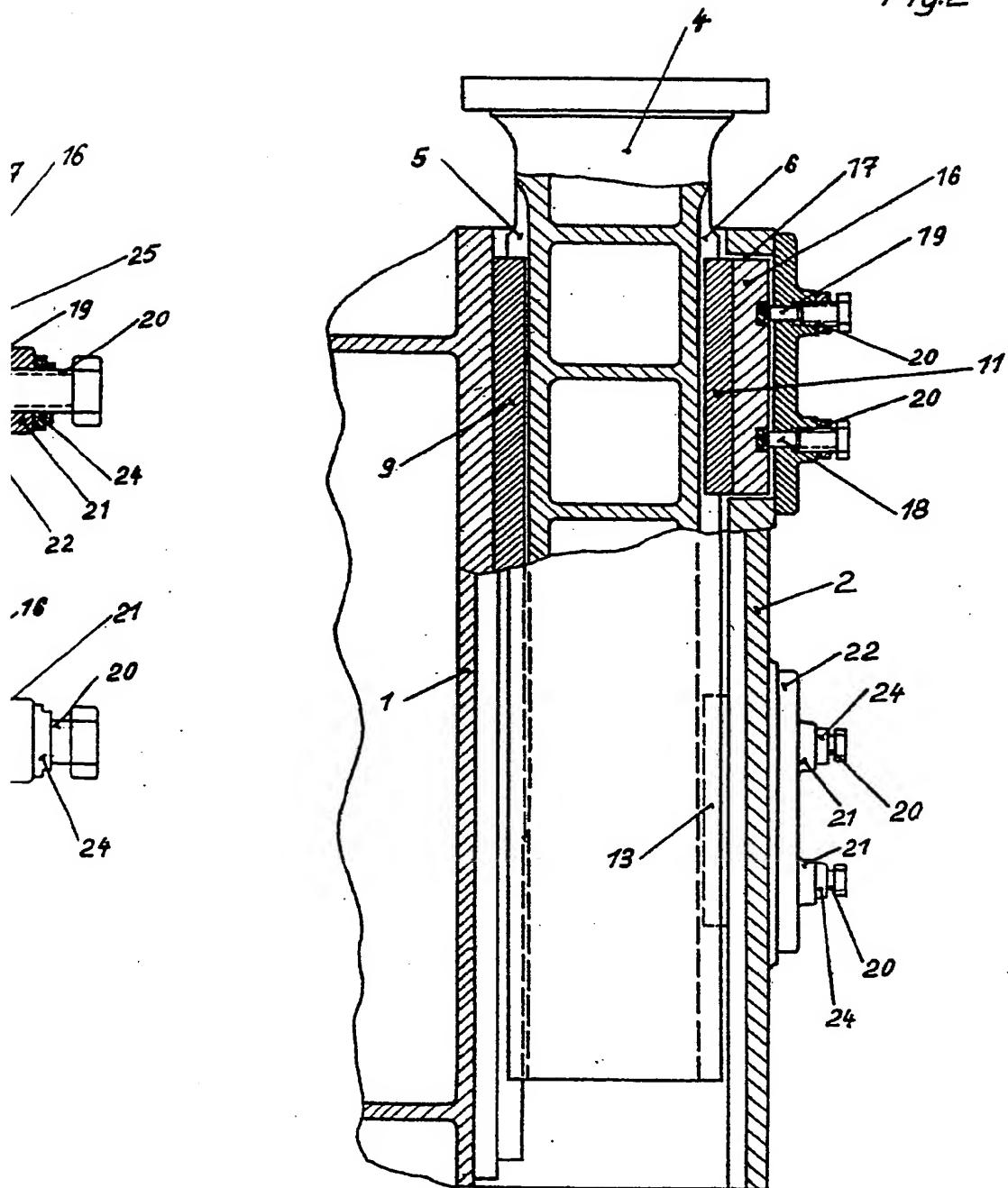
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SHEETS 1 & 2

the Original on a Reduced scale.  
SHEETS 1 & 2

**SHEETS 1 & 2**

Fig. 2



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Fig. 2

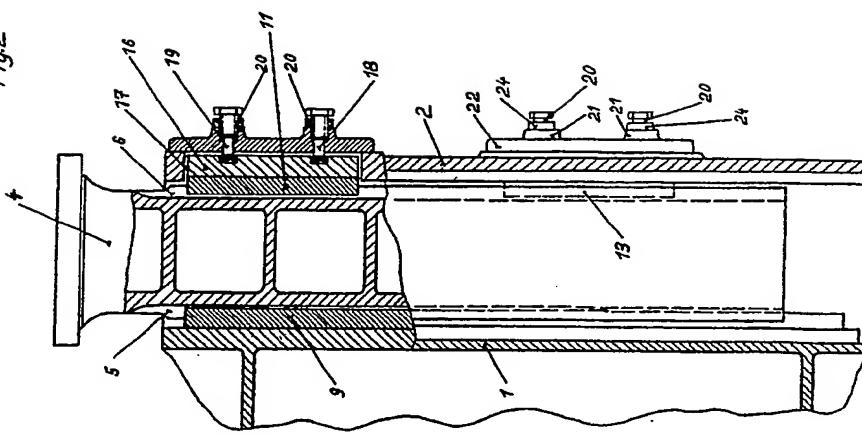


Fig. 1

